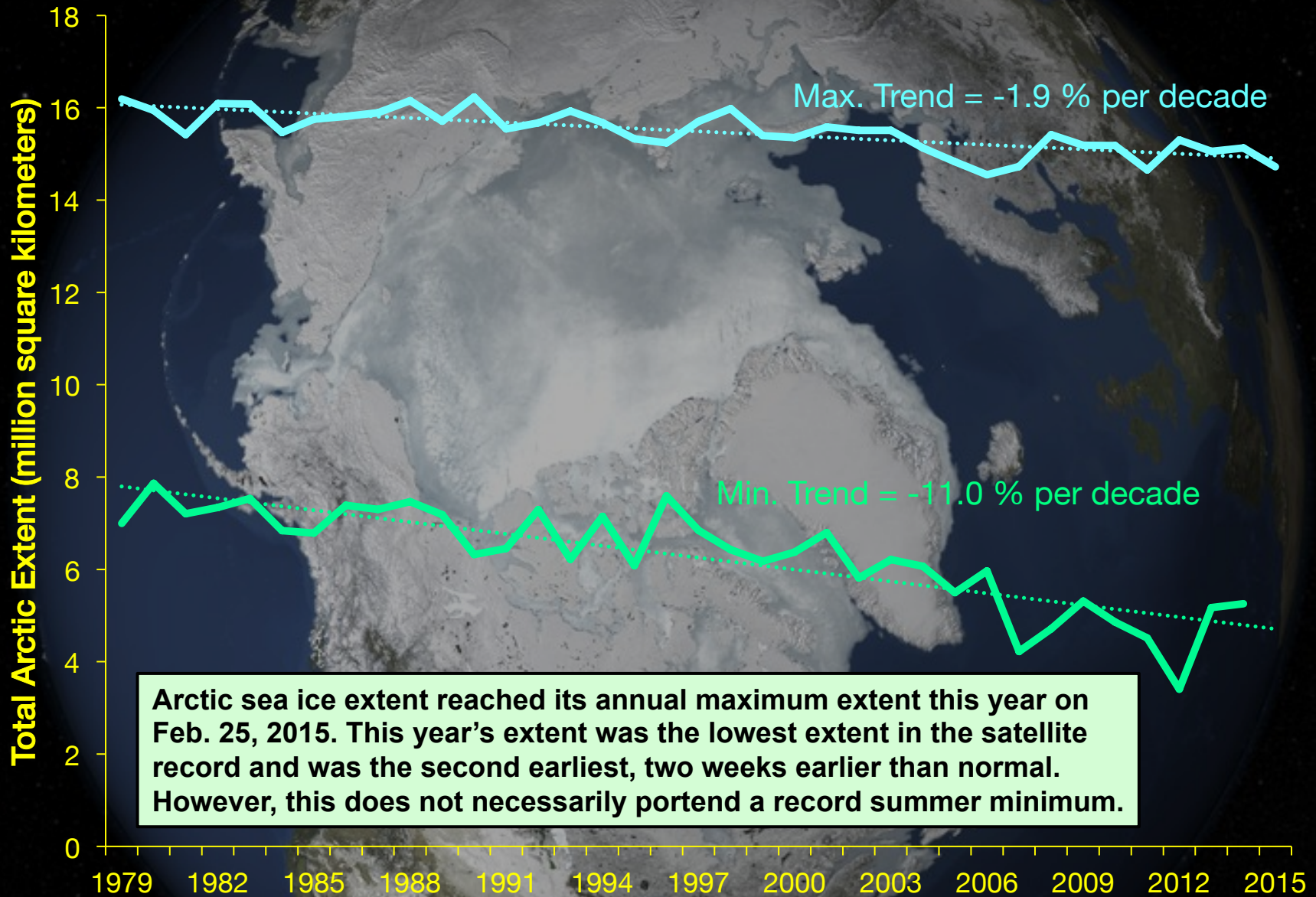
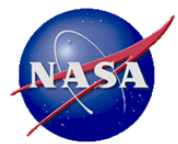




Arctic Sea Ice Maximum and Minimum Extent 1979-2015

Walt Meier and Josefino Comiso, Cryospheric Sciences, NASA GSFC





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References:

A joint announcement was made by NASA Goddard and the National Snow and Ice Data Center (NSIDC), Boulder, CO. The releases were published on NSIDC's Arctic Sea Ice News and Analysis web page and the NASA News Releases. Multimedia material was developed by NASA Goddard's Scientific Visualization Studio (SVS). NSIDC is a NASA Distributed Active Archive Center (DAAC).

NASA Release: <http://www.nasa.gov/content/goddard/2015-arctic-sea-ice-maximum-annual-extent-is-lowest-on-record/>

NSIDC Announcement: <http://nsidc.org/arcticseaicenews/2015/03/2015-maximum-lowest-on-record/>

NASA SVS Material: <http://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=11816>

Data Sources:

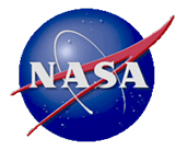
Sea ice extent data are from the Bootstrap algorithm, distributed by the National Snow and Ice Data Center Sea Ice Index (reference below); near-real-time (2015) data from J. Comiso, NASA Goddard. The background image is the sea ice cover on 25 February 2015, the date of the maximum extent for the year, from the AMSR2 sensor on JAXA's GCOM-W1 satellite overlaid on the NASA Blue Marble; the image was produced by the NASA Goddard Scientific Visualization Studio (SVS). Trend is calculated relative to the 1979 trend value of the maximum and minimum extents. Total extent refers to the sum of all areas that have at least 15% concentration ice cover.

Comiso, J. C. 2000, updated 2014. *Bootstrap Sea Ice Concentrations from Nimbus-7 SMMR and DMSP SSM/I-SSMIS*. Version 2. Boulder, Colorado USA: NASA National Snow and Ice Data Center Distributed Active Archive Center. <http://dx.doi.org/10.5067/J6JQLS9EJ5HU>.

Technical Description of Figure:

The figure shows the maximum extent (blue) for 1979 to 2015 and the minimum extent (green) for 1979 to 2014. The maximum and minimum extents are daily total area of ice with at least 15% concentration and are based on a 5-day trailing average of daily values (this is done to remove short-term noise due to satellite/algorithm errors and synoptic effects). A linear trend line is fit to both time series and relative trends are given in % per decade relative to the 1979 trend value.

Scientific significance, societal relevance, relationships to future missions: The Arctic sea ice is declining at a significant rate, most prominently in summer, but significant trends are also found in winter (maximum extent). The loss of sea ice has substantial implications for climate (more solar absorption by the larger ocean area during summer, potential effects on weather patterns), human activities in the Arctic (resource extraction, national security, indigenous culture), and ecology (polar bears, etc.). There is also evidence that ice is thinning, though data has historically been sparse. ICESat-2 will significantly increase our understanding of thickness and changes in the sea ice mass balance, provide a more complete picture of Arctic sea ice change, inform policymakers and other stakeholders in the future of the Arctic, and enhance predictive capabilities of models on seasonal to decadal time scales.

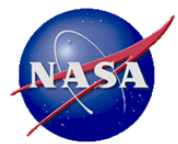


Algodones Dunes characterization campaign 2015

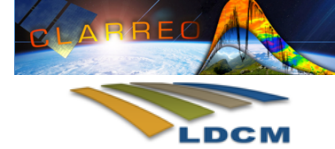
Joel McCorkel, Bruce Cook, Biospheric Sciences, NASA GSFC and Chip Bachmann, RIT



Inter-calibration of Earth-observing sensors is improved with physical models of pseudo-invariant test sites supported by field observations. This ground and airborne campaign, coincident with satellite observations, took place in southern California and brought together international research groups for a comprehensive characterization of spectral reflectance, Bidirectional Reflectance Distribution Function (BRDF), and topography.



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References:

McCorkel, J., et al, "Characterization of Algodones Dunes with airborne measurements for satellite cross-calibration," IGARSS, in prep, 2015.

Data Sources: Reflectance data is derived from a portable version of the reflected solar instrument of the Climate Absolute Radiance and Refractivity Observatory (CLARREO) that was designed, built, and characterized at GSFC. Airborne data is from the Goddard Lidar, Hyperspectral and Thermal (G-LiHT) observation platform. BRDF and physical sampling is from Rochester Institute of Technology and University of Lethbridge.

Technical Description of Figures:

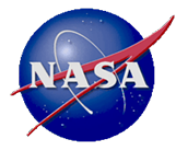
Graphic a: Digital elevation model of Algodones Dunes derived from Lidar measurements from G-LiHT.

Graphic b: Reflectance measurements of canvas calibration tarps using a portable version of the CLARREO imaging spectrometer. The tarps are targets for the G-LiHT imaging spectrometer.

Graphic c: The Goniometer at the Rochester Institute of Technology (GRIT) taking measurements of a reference target as G-LiHT flies over.

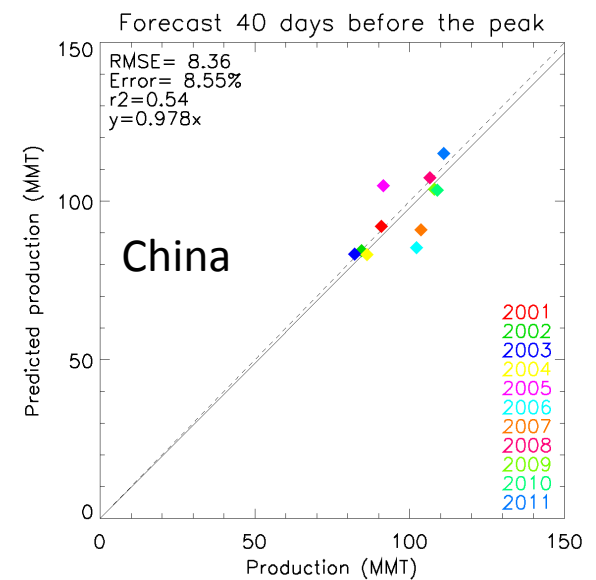
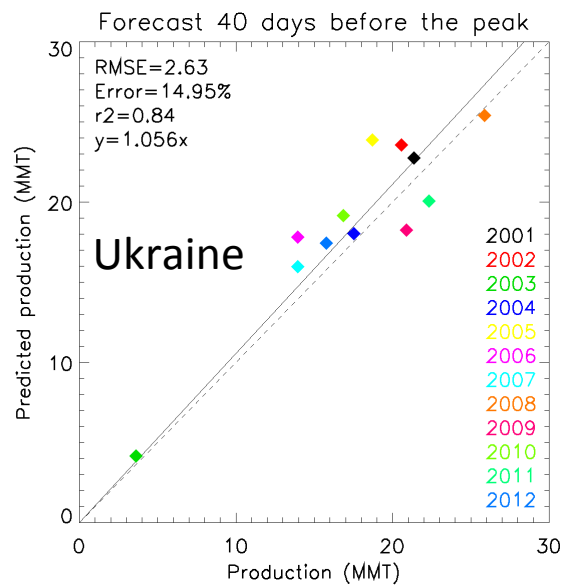
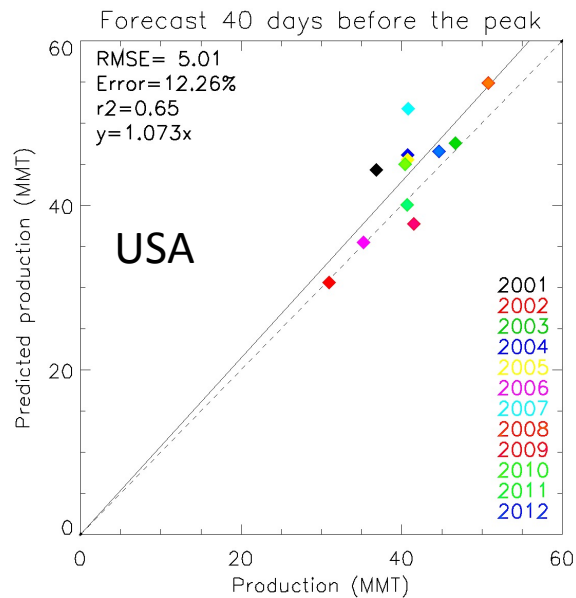
Scientific significance, societal relevance, and relationships to future missions:

A field campaign was held at Algodones Dunes in southern California during March 8-14, 2015. The purpose of the campaign is to characterize the test site to build accurate models for improved satellite sensor inter-calibration and test calibration transfer techniques between laboratory, field and airborne instruments. Primary parameters of the test site characterized in this work are spectral reflectance, BRDF, and spatial variability. Due to the stability of the dunes, these data provide a link to historical satellite measurements so that the calibration of current and future sensors can be transferred back in time. More immediately, this research directly benefits Sustainable Land Imaging since it will be used to bridge data of Sentinel 2 with the gold-standard calibration of the Landsat 7 and Landsat 8 sensors.



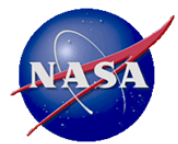
Timely and accurate winter wheat production forecasts for major producers using MODIS data and growing degree day information

Eric Vermote Code 619, NASA GSFC



The results show that the earliest time winter wheat production can be forecasted within an error of 10% is roughly 40 days prior to the average date of the NDVI peak, that is 70 days prior to the harvest (Franch et al. 2015).

It should be noted that official statistics are generally available 3-5 months after harvest. As these are major global wheat producers, they play a critical role in international crop markets and therefore early, reliable information is critical.



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References:

Becker-Reshef, I., Vermote, E., Lindeman, M., & Justice, C. (2010). A generalized regression-based model for forecasting winter wheat yields in Kansas and Ukraine using MODIS data. *Remote Sensing of Environment*, 114(6), 1312-1323.[doi: 10.1016/j.rse.2010.01.010]

Franch B., Vermote E.F., Becker-Reshef I., Claverie M., J. Huang, Zhang J., Justice C. & Sobrino J.A. (2015) Improving the timeliness of winter wheat production forecast in the United States of America, Ukraine and China using MODIS data and NCAR Growing Degree Day information, *Remote Sensing of Environment*, 161,131-148.[doi:10.1016/j.rse.2015.02.014]

Data Sources: The MODIS surface reflectance product is being tested and generated by Code 619.

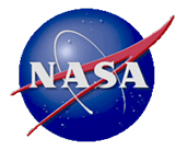
Technical Description of Figures:

The forecast method of Becker-Reshef et al., 2010 that uses daily MOD09 CMG data (produced by code 619) to detect the peak NDVI and predict yield was adapted to use Growing Degree Day allowing for an earlier prediction scheme (Franch et al. 2015)

Figure 1: By combining, the BRDF-corrected daily surface reflectance from the Moderate resolution Imaging Spectroradiometer (**MODIS**) Climate Modeling Grid (CMG) product , detailed official crop statistics, **crop type masks** and **Growing Degree Day** (GDD) information extracted from NCEP/NCAR reanalysis data, an empirical generalized model for forecasting winter wheat production was developed. This model was applied to the three major world producers (**Top right**) USA, (**Top Left**) Ukraine (**Bottom**) China, the production is expressed in Million Metric Tons (MMT). The accuracy of the forecast for the combined production of those three countries 70 days prior to harvest was about 11%.

Scientific significance, societal relevance, and relationships to future missions :

Continuous and systematic high quality Earth Observations from NASA satellites provide the critical synoptic and objective information needed by applications of societal benefit in the context of growing population and climate change. Demonstrating how to use current sensors to understand our changing planet and delivering those data to the global community is part of NASA mission and is critical to develop future missions and sensors to further improve other government agencies and partner organizations decision-making.



Climate Data Initiative Releases Human Health Theme

Curt Tilmes, Terrestrial Information Systems, NASA/GSFC

Wildfire Smoke has Widespread Health Effects



Figure 1

Figure 2

The White House

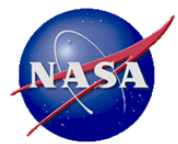
Office of the Press Secretary

For Immediate Release

April 07, 2015

FACT SHEET: Administration Announces Actions To Protect Communities From The Impacts Of Climate Change

NASA was tasked with implementing the White House Climate Data Initiative (CDI), and is working closely with the EOP and other Federal Agencies to make available relevant data and resources within the Federal Government to support climate resilience. These resources, available at climate.data.gov, are organized around seven different themes: 1) Coastal Flooding, 2) Food Resilience, 3) Water, 4) Ecosystem Vulnerability, 5) Human Health, 6) Energy, and 7) Transportation.



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References:

FACT SHEET: Administration Announces Actions To Protect Communities From The Impacts Of Climate Change.

<https://www.whitehouse.gov/the-press-office/2015/04/07/fact-sheet-administration-announces-actions-protect-communities-impacts->

National Climate Assessment. <http://nca2014.globalchange.gov/>

FACT SHEET: The President's Climate Data Initiative: Empowering America's Communities to Prepare for the Effects of Climate Change.

<https://www.whitehouse.gov/the-press-office/2014/03/19/fact-sheet-president-s-climate-data-initiative-empowering-america-s-comm>

Data Sources:

Climate Data Initiative: <http://www.data.gov/climate/>

Human Health Theme: <http://www.data.gov/climate/humanhealth/>

Technical Description of Image:

Figure 1: Wildfires, which are projected to increase in some regions due to climate change, have health impacts that can extend hundreds of miles. Shown here, forest fires in Quebec, Canada, during July 2002 (red circles) resulted in up to a 30-fold increase in airborne fine particle concentrations in Baltimore, Maryland, a city nearly a thousand miles downwind. These fine particles, which are extremely harmful to human health, not only affect outdoor air quality, but also penetrate indoors, increasing the long-distance effects of fires on health. An average of 6.4 million acres burned in U.S. wildfires each year between 2000 and 2010, with 9.5 and 9.1 million acres burned in 2006 and 2012, respectively. Total global deaths from the effects of landscape fire smoke have been estimated at 260,000 to 600,000 annually between the years 1997 and 2006. (Figure source: Moderate Resolution Imaging Spectroradiometer (MODIS) instrument on the Terra satellite, Land Rapid Response Team, NASA/GSFC) <http://nca2014.globalchange.gov/report/sectors/human-health>

Figure 2: FACT SHEET: Administration Announces Actions To Protect Communities From The Impacts Of Climate Change.

<https://www.whitehouse.gov/the-press-office/2015/04/07/fact-sheet-administration-announces-actions-protect-communities-impacts->

Scientific significance: On April 7th, the Climate Data Initiative released 150 datasets from 13 government agencies in support of the Human Health theme. *"The new theme aims to empower America's people, communities, and health sector to more effectively plan, prepare, and strengthen their resilience to the health-impacts of climate change."* CDI climate and health announcements were featured in over 30 major news outlets. NASA is helping the Federal Government identify data and resources relevant to building climate resilience, and making those more discoverable, accessible and usable by the Data Innovation Community.

Relevance for future science and relationship to Decadal Survey: The CDI exercise helps NASA, and the Federal Government in general, identify the most relevant data for applied sciences, and assess any existing gaps in Earth Observation data, knowledge and information.